

ALGEBRAIC EXPRESSIONS & SOLVING EQUATIONS

A. ALGEBRAIC EXPRESSIONS

- Algebraic expressions and formulae are evaluated by substituting the given numbers in place of the variables. Then follow the order of operations to calculate the answer.

- Order of Operations:

B - simplify **B**rackets
E - simplify **E**xponents (powers)
D - **D**ivide → in the order they come
M - **M**ultiply → in the order they come
A - **A**dd → in the order they come
S - **S**ubtract → in the order they come

Example #1: Find the value of $2x^2 - 3xy + y^2 + 4$ if $x = -2$ and $y = 3$.

$$\begin{aligned} & 2(-2)^2 - 3(-2)(3) + (3)^2 + 4 \\ & 2(4) - 3(-6) + 9 + 4 \\ & 8 + 18 + 9 + 4 \\ & 39 \end{aligned}$$

Example #2: The formula for finding the volume of a cylinder is $V = \pi r^2 h$. Find the volume for a cylinder with a radius of 2.5 cm and a height of 7.15 cm.

$$\begin{aligned} V &= (3.14)(2.5)^2(7.15) \\ &= (3.14)(6.25)(7.15) \\ &= 140.32 \text{ cm}^3 \end{aligned}$$

B. SIMPLIFYING ALGEBRAIC EXPRESSIONS

Algebraic expressions contain both numbers and variables. Algebraic expressions can only be simplified if they contain like terms.

- Like terms must have the same variable and the same exponents.
- Terms are the product of a coefficient and a variable.
- Terms are separated by plus or minus signs.

Algebraic expressions with one or more terms are called polynomials. Simple polynomials are given special names:

- Monomial** → one term → $8x$
- Binomial** → two terms → $5x - 9$
- Trinomial** → three terms → $6x^2 - 8x + 12$

1

C. SOLVING EQUATIONS

A solution, or root, to an equation is a number that makes the left side equal the right side.

- Eliminate all brackets using the distributive property.
- Eliminate all fractions by multiplying each term by the lowest common denominator.

Example #4: Solve each equation.

a) $13x + 9 = 11x + 5$ b) $x + 6(y - 3) = 2(3y - 2)$ c) $\frac{3x}{4} - 2 = \frac{1}{2}(t + 2)$

$$\begin{aligned} 13x + 9 &= 11x + 5 \\ 2x + 9 &= 5 - 9 \\ 2x &= -4 \\ x &= -2 \end{aligned}$$

$$\begin{aligned} x + 6(y - 3) &= 2(3y - 2) \\ x + 6y - 18 &= 6y - 4 \\ x &= 14 \end{aligned}$$

$$\begin{aligned} \frac{3t}{4} - 2 &= \frac{1}{2}(t + 2) \\ 4\left(\frac{3t}{4} - 2\right) &= 4\left(\frac{1}{2}(t + 2)\right) \\ 3t - 8 &= 2(t + 2) \end{aligned}$$

$$\begin{aligned} 3t - 8 &= 2t + 4 \\ 3t - 2t &= 4 + 8 \\ t &= 12 \end{aligned}$$

Example #3: Simplify.

a) $2c + 3c + 4$

$$5c + 4$$

c) $2(2a + b) - 3(3a - 2b)$

$$\begin{aligned} 4a + 2b - 9a + 6b \\ -5a + 8b \end{aligned}$$

b) $(2x^2 + 3) + (-4x^2 + 8)$

$$\begin{aligned} 2x^2 + 3 - 4x^2 + 8 \\ -2x^2 + 11 \end{aligned}$$

d) $(3x^2 + 1)(x - 2)$

$$\begin{aligned} 3x^2 - 6x^2 + x - 2 \\ 2x^2 - 13x - 7 \end{aligned}$$